**DRAFT**
**ENGINEERING EVALUATION**
**Verizon Wireless (Hesperian & A Street), Plant: 18481**
**Application: 16191**

## BACKGROUND

Verizon Wireless (Hesperian & A Street) has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

**S-1 Standby Diesel Generator**
**John Deere Engine Model: 5030HF270**
**96 BHP; 0.71 MMBTU/hr**

at 1990 Skywest Dr., Hayward CA94541. It will provide emergency power (in the event of a blackout) for all essential electrically powered equipment at the facility. These emergency engines must be periodically tested to ensure that they will generate power when needed. Testing or maintenance may not be conducted between 7:30 a.m. and 3:30 p.m. on days when school is in session.

The Emergency Diesel Engine Generator Set (S-1) is equipped with the best available control technology (BACT) for minimizing the release of air borne criteria pollutants and harmful air toxins due to fuel combustion. The criteria pollutants are nitrogen oxides (NOx), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO2) and particulate matter (PM10). All of these pollutants are briefly discussed on the District's web site at baaqmd.gov.

S-1 meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 2 Off-road standard. The engine will burn commercially available California low sulfur diesel fuel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight. The operation of the engine should not pose any health threat to the surrounding community or the public at large.

## EMISSIONS

**Annual Average Emissions:**
The diesel engine (S-1) is CARB Certified and the emission factors are listed below. These factors are based on the CARB emissions factors as well as 5-mode testing, submitted to CARB. For this report, it is assumed that the emission value of Total Unburned Hydrocarbons (HC) is equivalent to the emission value of POC. Verizon has asked to run S-1 for 50 hours per year for testing and maintenance.

| | |
|---|---|
| NMHC + NOx: | 5.26 g/hp-hr |
| NMHC (~ POC): | 0.34 g/hp-hr |
| NOx: | 4.92 g/hp-hr |
| CO: | 0.746 g/hp-hr |
| $PM_{10}$: | 0.09 g/hp-hr |

**NOx:**
= (50 hr/yr)(96 hp)(4.92 g/hp-hr)(lb/454 g)
**= 52.02** lb/yr or **0.0260** TPY

**POC:**
= (50 hr/yr)(96 hp)(0.34 g/hp-hr)(lb/454 g)
**= 3.59** lb/yr or **0.0018** TPY

**CO:**
= (50 hr/yr)(96 hp)(1 g/hp-hr)(lb/454 g)
**= 7.89** lb/yr or **0.00394** TPY

**PM10:**
= (50 hr/yr)(96 hp)(0.09 g/hp-hr)(lb/454 g)
**= 0.95** lb/yr or **0.000476** TPY

SO2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 5.2 gal/hr.

**$SO_2$:**
= (0.000015 lb S/lb fuel)(7.206 lb fuel/gal fuel)(5.2 gal fuel/hr)(64 lb SO2/32 lb S)(50 hr/yr)
= **0.056** lb/yr or **0.00003** TPY

**Maximum Daily Emissions:**
Maximum Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). 24-hr/day of operation will be assumed since no daily limits are imposed on intermittent and unexpected operations.

**NOx:**
= (24 hr/day)(96 hp)(4.92 g/hp-hr)(lb/454 g) = **24.97** lb/day

**POC:**
= (24 hr/day)(96 hp)(0.34 g/hp-hr)(lb/454 g) = **1.73** lb/day

**CO:**
= (24 hr/day)(96 hp)(0.75 g/hp-hr)(lb/454 g) = **3.79** lb/day

**PM10:**
= (24 hr/day)(96 hp)(0.09 g/hp-hr)(lb/454 g) = **0.46** lb/day

SO2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 4.8 gal/hr.

**$SO_2$:**
= (0.000015 lb S/lb fuel)(7.206 lb fuel/gal fuel)(5.2 gal fuel/hr)(64 lb SO2/32 lb S)(24 hr/day)
= **0.027** lb/day

## PLANT CUMULATIVE INCREASE

Verizon Wireless (Hesperian & A St) is a new facility. Therefore, the District's database does not contain information on existing emissions at the plant. Table 1 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant 18352 from the operation of S-1.

**Table 1**

| Pollutant | Current plant emissions (TPY) | Increase in plant emissions associated with this application (TPY) | Cumulative emissions (Current + Increase) (TPY) |
|---|---|---|---|
| NOx | 0 | 0.0260 | 0.0260 |
| POC | 0 | 0.0018 | 0.0018 |
| CO | 0 | 0.00394 | 0.00394 |
| PM10 | 0 | 0.000476 | 0.000476 |
| SO2 | 0 | 0.00003 | 0.00003 |

## TOXIC RISK SCREENING ANALYSIS

The cancer risk is calculated based on the emission rate of diesel exhaust particulate matter. Diesel exhaust particulate matter is used as a surrogate for all toxic contaminants found in diesel exhaust. Because the proposed emissions exceed the risk screening trigger level for diesel exhaust particulate matter in Table 2-5-1, a risk screening was performed.

In order for these engines to meet the risk level set by the District's Risk Management Policy, the applicant has requested that S-1's hours of operation, excluding periods when operation is required due to emergency conditions, be limited to no more than 50 hours per year. Results from the health risk screening analysis indicate that the maximum cancer risk is estimated at 0.41 in a million if the engine were to run for 50 hours/year.

Estimates of residential risk assume exposure to annual average toxic air contaminate concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

Based on 50 hours per year of operation, the emergency generator passed the Health Risk Screening Analysis (HRA) conducted on July 2, 2007 by the District's Toxic Evaluation Section. This source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (worker) is 0.4 in a million. The hazard index for a worker is 0.00029. The increased cancer risk to residents is 0.007 in a million and the hazard index is 0.0000043. The increased cancer risk to students is 0.01 in a million and the hazard index is 0.000031. In accordance with the District's Risk Management Policy, the above risk level is considered acceptable for an engine such as S-1 that meets the current TBACT requirements. For more information on the District's Risk Management Policy, please see:

http://www.baaqmd.gov/pmt/air_toxics/risk_procedures_policies/diesel_rmp_011102.pdf

## BACT

BACT is triggered for NOx and CO since the maximum daily emissions of the above pollutant exceeds 10 lb/day. BACT is triggered for NOx since the maximum daily emissions of the above pollutant exceeds 10 lb/day. Please refer to the discussion on "Daily Emissions" in page 2 of this evaluation. BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for this source category as shown below:

| Source: | ***IC Engine - Compression Ignition*** | Revision: | ***5*** |
|---|---|---|---|
| | | Document #: | ***96.1.1*** |
| Class: | ***< 175 horsepower output rating*** | Date: | ***01/11/02*** |

| POLLUTANT | BACT<br>1. Technologically Feasible/ Cost Effective<br>2. Achieved in Practice<br>3. TBACT | TYPICAL TECHNOLOGY |
|---|---|---|
| POC | 1. *1.1 g/bhp-hr [216 ppmvd @ 15% $O_2$] [a,b]*<br>2. *1.5 g/bhp-hr [309 ppmvd @ 15% $O_2$] [b,c]* | 1. *Catalytic Oxidation and/or CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [a,b]*<br>2. *CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [b,c]* |
| NOx | 1. *1.5 g/bhp-hr [107 ppmvd @ 15% $O_2$] [a,b]*<br>2. *6.9 g/bhp-hr [490 ppmvd @ 15% $O_2$] [a,b,c]*<br>3. *6.9 g/bhp-hr [490 ppmvd @ 15 % $O_2$] [d]* | 1. *Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler [a,b]*<br>2. *Timing Retard ≤ 4° + Turbocharger w/ Intercooler [a,b,c]*<br>3. *Timing Retard ≤ 4° + Turbocharger w/Intercooler* |
| $SO_2$ | 1. *n/d*<br>2. *If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel"( fuel oil < 0.05% by weight sulfur) [a,b]* | 1. *n/d*<br>2. *Fuel Selection [a,b]* |
| CO | 1. *n/s*<br>2. 2.75 *g/bhp-hr [319 ppmvd @ 15% O2] [b,c]* | 1. *Catalytic Oxidation[b]*<br>2. *CARB or EPA (or equivalent) low-CO emitting certified engine [b,c]* |
| $PM_{10}$ | 1. *n/d*<br>2. *If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel" ( fuel oil w/ < 0.05% by weight sulfur and < 20% by volume aromatic hydrocarbons) [b]*<br>3. *0.1 grams/bhp-hr* | 1. *Catalyst Guard Bed [a,b]*<br>2. *Fuel Selection [b]*<br>3. *CARB or EPA (or equivalent) low-particulate matter emitting certified engine, or particulate filter* |
| NPOC | 1. *n/a*<br>2. *n/a* | 1. *n/a*<br>2. *n/a* |

***References***

*a. CARB/CAPCOA Clearinghouse*
*b. BAAQMD, NOTE: IC Engine BACT and TBACT is a low emitting, spark-ignited, gas-fueled engine with lean burn combustion or rich burn with non-selective catalytic reduction, or electric motor. A diesel engine will be permitted only if a gas-fueled engine, or electric motor, is not practical (e.g., a remote location without natural gas*

*availability or electric power, or only a diesel engine will meet the portability and/or power/torque/rpm requirements of the application under review, or the engine is used exclusively for emergency use during involuntary loss of power).*
*c. Timing retard, etc. controls alone may be acceptable only in very limited situations for temporary sources.*

The more restrictive BACT 1 standards levels do not apply for engines used exclusively for emergency use during involuntary loss of power as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet the BACT 2 limits.

It can be seen from above that S-1 satisfies the current BACT 2 standard for NOx (6.9 g/hp-hr) because the CARB certified level is below the BACT 2 requirements.

## OFFSETS

Offsets are not required since the facility's POC and NOx emissions are each less than 15 ton/yr per Regulation 2-2-302.

## CARB STATIONARY DIESEL ENGINE ATCM

The State Office of Administrative Law approved the Airborne Toxic Control Measure (ATCM) on November 8, 2004. State law requires the local Air Districts to implement and enforce the requirements of the ATCM. Effective January 1, 2005, there is a prohibition on the operation of new diesel emergency standby engines greater than 50 bhp unless the following operating requirements and emission standards are met:

**"Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations.**

**Diesel PM – General Requirements**

1. Meet 0.15 g/bhp-hr PM standard
2. Operate 50 hours per year, or less, for maintenance and testing (except emergency use and emissions testing)

**HC,NOx, NMHC+NOx, CO**

1. Meet standards for off-road engines of the same model year and horsepower rating
   As specified in the OFF-Road Compression Ignition Engine Standards;
   Or if no standards have been established
2. Meet the Tier 2 standards in Title 13, CCR, Section 2423 for off-road engines of the same horsepower rating, irrespective of the new engine's model year

This emergency standby diesel engine (S-1) is in compliance with the above ATCM requirements. The diesel engine will operate for no more than 50 hours per year for maintenance and reliability testing. This engine is subject to the EPA Tier 2 requirements for HC, NOx, NMHC+NOx and CO. As shown in the Table 4, the engines meet these requirements.

**Table 4. ATCM Tier 2 Compliance**

| | CARB g/bhp-hr | ATCM Tier 2 g/bhp-hr |
|---|---|---|
| NMHC (POC) | 0.34 | N/A |
| NOx | 4.92 | N/A |
| NMHC+NOx | 5.26 | 5.6 |
| CO | 0.76 | 3.7 |
| PM | 0.09 | 0.3 |

**STATEMENT OF COMPLIANCE**

Source S-1 is subject to and expected to be in compliance with the requirements of District Regulation 1-301 (*Public Nuisance*), Regulation 6-303 (*Particulate Matter and Visible Emissions*), Regulation 9-1 (*Sulfur Dioxide*) and Regulation 9-8 (*NOx and CO from Stationary Internal Combustion Engines*). In order to ensure compliance with the requirements of these regulations, the facility will be conditionally permitted to meet the requirements.

From Regulation 1-301, no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property. For purposes of this section, three or more violation notices validly issued in a 30 day period to a facility for public nuisance shall give rise to a rebuttable presumption that the violations resulted from negligent conduct.

S-1 is subject to the limitations of Regulation 6-303 (*Particulate Matter and Visible Emissions*). Regulation 6, Section 303 states that a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. This low PM10 emitting engine is not expected to produce visible emissions or fallout in violation of this regulation, and it will be assumed to be in compliance with Regulation 6 pending a regular inspection S-1 is also subject to the $SO_2$ limitations of Regulation 9-1-301 (*Limitation on Ground Level Concentrations of Sulfur Dioxide*), Regulation 9-1-302 (*Limitations Sulfur Dioxide Emissions*) and 9-1-304 (*Burning of Solid and Liquid Sulfur Dioxide Fuel*). From Regulation 9-1-301, the ground level concentrations of $SO_2$ will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Per Regulation 9, Rule 1, Section 302, a person shall not emit from any source a gas stream containing sulfur dioxide in excess of 300 ppm (dry). And Regulation 9, Rule 1, Section 304, states that a person shall not burn any liquid fuel having sulfur content in excess of 0.5% by weight. Compliance with both Regulations 9-1-302 and 9-1-304 is likely since California law mandates using diesel fuel with a 0.05% by weight sulfur.

Regulation 9-8 "NOx and CO from Stationary Internal Combustion Engines." From Regulation 9-8-110.4, the source is not subject to the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waster Derived Fuel Gas*), and 9-8-502(*Record Keeping*).

S-1 is exempt from Regulation 9-8-502 however; it is subject to the monitoring and record keeping procedures described in Regulation 9-8-530(*Emergency Standby Engines, Monitoring and Recordkeeping*). The requirements of this Regulation are included in the permit conditions

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet of the nearest school and therefore the owner/operator is subject to the public notification requirements of Reg. 2-1-412. A public notice will be prepared and sent to:

All addresses within 1000 feet of the diesel generator.
Parents and guardians of students at St. Joachim Catholic School within one-quarter mile of the diesel generator.

Offsets, PSD, NSPS, and NESHAPS are not triggered.

## l
## PERMIT CONDITIONS

Condition No. 22850

1. Operating for reliability-related activities is limited to 50 hours per year per engine.

   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(B)(3) or Regulation 2-5]

2. The owner or operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, state or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, state or Federal emission limits is not limited.

   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3)] or (e)(2)(B)(3)]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.

   [Basis:"Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(4)(G)(1)]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been

issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.

a. Hours of operation for reliability-related activities (maintenance and testing).
b. Hours of operation for emission testing to show compliance with emission limits.
c. Hours of operation (emergency)
d. For each emergency, the nature of the emergency condition.
e. Fuel usage for each engine(s).

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]

1. At School and Near-School Operation:
   If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

   The owner or operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

   a. Whenever there is a school sponsored activity (if the engine is located on school grounds).
   b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

"School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, playground, athletic field, or other areas of school property but does not include unimproved school property.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

End of Conditions

**By Emily Cheng**
**Air Quality Engineering Intern**
**7/11/07**